UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

VOL. XVI. WASHINGTON CITY, MARCH, 1888. No. 3.

INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for March, 1888, and is based upon the reports of regular and voluntary observers of both countries. Descriptions of the storms that occurred over the north Atlantic Ocean are also given, and their approximate paths shown on chart i, on which also appear the distribution of icebergs and field-ice and the limits of fog-belts west of the fortieth meridian. In the vicinity of Newfoundland the aggregate quantity of ocean ice reported was largely deficient, when compared with the average for March.

The month was colder than the average in nearly all districts, the temperature departures ranging from 4° to 10° over a large part of the country. In northern New England, however, the mean temperatures were considerably above the average.

The rainfall was generally in excess of the average, although there are several areas in which it was deficient.

The severe storm of March 11–14th forms the most important feature of the month, a full report of which, with special charts showing the attending atmospheric conditions, is given herein.

In the preparation of this REVIEW the following data, received up to April 20, 1888, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at 133 Signal Service stations and 23 Canadian stations, as telegraphed to this office; 180 monthly journals and 176 monthly means from the former and 23 monthly means from the latter: 315 monthly registers from voluntary observers; 60 monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the Hydrographic Office, United States Navy, and the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Arkansas, Colorado, Illinois, Indiana, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New England, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee, and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean pressure for March 1888, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The mean pressure is greatest in the extreme northwest and over the region extending thence southeastward to the south Atlantic and east Gulf states, being 30.2, or slightly more, in the first-named districts, about 30.12 in the lower lake region, Ohio and central Mississippi valleys, and 30.15 in portions of Tennessee, Georgia, Florida, and the Carolinas. Eastward of this area of high mean pressure the barometric means fall to 29.95, or below, in northern New England and the Canadian Maritime Provinces; to the westward of the high area the mean pressure does not fall below 30.0, except over the southern Rocky Mountain districts, where a considerable area is inclosed by the isobar of 29.95. The extreme barometric means for the month are: highest, Fort Garry, Manitoba, 30.23; lowest, Sydney, N. S., 29.88; range, .35.

The departures from the normal pressure at the various Signal Service stations are given in the table of miscellaneous meteorological data. In the Rocky Mountain and Pacific coast districts the mean pressure is slightly below the normal, the deficiency not exceeding .06 at any station, and being less than .05, except over portions of the plateau districts and central California. Eastward of the Rocky Mountains the mean pressure is above the normal in all districts, the greatest departures occurring in the Lake region, where they range from .08 to .12; in New England, the Gulf States, and lower Missouri valley the mean pressure generally ranges from .02 to .05 above the normal.

Comparison of the mean pressure of March with that of the preceding month shows an increase in all districts, with the exception of the plateau and Pacific coast regions, and on the Atlantic coast northward of Virginia. The deficiency exceeds .10 in the middle and northern plateau districts, on the north Pacific coast, and in the Maritime Provinces of Canada; the excess ranges from .05 to .14 in northern districts from Montana eastward to the lower lakes, and from .01 to .05 in the central valleys and Southern States.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the table of miscellaneous meteorological data. The ranges, as usual, conform to the general rule, that is, they increase with the latitude and decrease slightly, though somewhat irregularly, with increasing longitude. In the states bordering on the Atlantic the extreme ranges are .38 at Key West, Fla., and 1.67 at Nantucket, Mass.; between the eighty-fifth and one hundredth meridians, .71 at Pensacola, Fla., and 1.47 at Saint Vincent, Minn.; eastern slope of the Rocky Mountains, .93 at Fort Davis, Tex., and 1.51 at Las Animas, Colo.; plateau region, .54 at Yuma, Ariz., and 1.04 at Salt Lake City, Utah; Pacific coast, .52 at San Diego, Cal., and .92 at Fort Canby, Wash. Compared with the normal barometric ranges for March, no very marked departures occur, except over the middle and southern Rocky Mountain slopes, where the ranges at some stations exceed the normal by more than half an inch.

AREAS OF HIGH PRESSURE.

Six well-defined areas of high pressure were observed during the month of March, 1888, within the limits of territory covered by the tri-daily weather charts. Of this number, one apparently approached the north Pacific coast from the west and crossed the continent, moving eastward to the Lake region, then southward to the Atlantic. Four were first observed in

the territory to the north of Montana and Dakota, and one to the north of Lake Superior. The general direction of movement was first to the southeast and afterward to the northeast.

The following table shows the latitude and longitude in which each area was first and last observed, the highest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Highest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	*Inches.*	*Miles.*
I	49 00	97 00	47 00	64 30	30.92	25.9
II	50 00	99 00	33 30	96 00	30.71	33.3
II*a*	50 30	94 30	31 00	83 00	30.70	16.6
III	47 30	123 00	38 00	74 30	30.52	26.1
IV	50 20	106 30	31 20	81 00	30.72	41.1
V	49 00	86 00	47 00	64 30	30.62	18.8
VI	50 20	107 30	35 00	76 00	30.52	31.2

Average rate of progress, 27.6 miles per hour.

I.—On the morning of March 1st the southern portion of this area is shown to occupy all of the United States between the Rocky and Appalachian Mountains. The centre of the area was located in the territory to the north of Dakota, where it remained without any apparent change of position, from February 29th to March 5th. The pressure at the most northerly stations increased until the morning of the 3d, reaching a height of 30.9, afterward it slowly decreased to 30.2 on the afternoon of the 6th, and the area moved to the southward until central over Arkansas, then to the eastward and finally to the northeast, disappearing off the coast of New Brunswick on the 10th, the central pressure having increased to 30.5. Light rains and snow were frequent within this area of high pressure until after the 5th, when they were of rare occurrence. A cold wave visited portions of the middle and southern slopes of the Rocky Mountains and the Missouri Valley on the 2d, the western Gulf states and the Ohio Valley on the 3d, and the middle Atlantic states on the 4th. The minimum temperatures of the month occurred from the 1st to the 6th over the northern slope of the Rocky Mountains, the Missouri Valley, Kansas, northern Colorado, Arizona, New Mexico, and Indian Territory; the temperature recorded at Helena and Fort Assinaboine, Mont., Fort Buford and Yankton, Dak., being lower than ever observed at those stations during any previous March.

II and II*a*.—At 10 p. m. of the 8th this area of high pressure was observed to the north of Montana. The area continued to extend to the southeast, and its centre appeared in north Dakota on the morning of the 10th, the pressure at the centre being near 30.5. During the 10th the movement was to the south, and on the 11th the area became very much elongated in a north and south direction and began to divide into two portions, one of which was central over the Indian Territory and the other over northern Minnesota. During the morning and afternoon of the 12th the two centres remained connected by a long narrow area, in which the pressure was but slightly lower than at the centres, but the 10 p. m. chart showed the division to be complete. The southern portion disappeared by a gradual decrease of pressure, while the northern portion assumed a position over Lake Superior, where it remained with pressure near 30.6 until the morning of the 14th, after which it moved southward with decreasing pressure and disappeared off the Gulf coast on the 16th. Fair weather, with fresh winds, prevailed within the limits of the area. A severe cold wave, during which the fall in temperature amounted to 30° in twenty-four hours, visited the middle and southern slopes on the 10th, and the temperature was below freezing. On the morning of the 11th the cold wave reached the upper Mississippi valley, the upper lake region, the western portion of the Ohio Valley and Tennessee, Arkansas, Mississippi, Louisiana, and eastern Texas, the fall ranging from 20° to 30° in twenty-four hours, the temperature everywhere north of Louisiana being below freezing. The minimum temperatures of the month occurred on the 11th, 12th, and 13th at most stations in the west Gulf states, the lower lake region, New York, Pennsylvania; at Pensacola, Fla., on the 12th; and at Mobile, Ala., on the 13th. The temperature at Fort Smith, Ark., on the 11th, and at Norfork, Va., on the 14th, was lower than ever before recorded at those stations in March.

III.—This area of high pressure apparently moved eastward from the north Pacific coast, its centre remaining to the north of the region of observation. During the 15th it extended to the southward over the northern and middle slopes of the Rocky Mountains and the Missouri Valley, and moved eastward during the morning and afternoon of the 16th over the upper Mississippi valley, after which the movement of the centre was apparently to the northeast, then to the southeast, passing off the coast of the middle Atlantic states on the morning of the 19th. The pressure at the centre remained nearly constant, 30.4, until 10 p. m. of the 15th, after which it decreased to 30.2. Generally fair weather, with light winds, prevailed within the limits of the area, and it was accompanied by a fall of temperature over northern Dakota and Minnesota of 20° in twenty-four hours. The fall of temperature was less marked in other portions of the country over which the area passed.

IV.—This area of high pressure apparently moved southeastward from the north Pacific coast. The advance isobars appeared over Montana on the afternoon of the 20th; the area advanced rapidly southeastward, and at 10 p. m. of the 21st its centre, bounded by the isobar of 30.4, extended from Texas northward beyond the region of observation. At three stations, Fort Sill, Ind. T., Huron, Dak., and Q'Appelle, N. W. T., the pressure was 30.5. The area maintained the central pressure and, gradually growing more circular in form, passed off the coast of the south Atlantic states on the afternoon of the 23d. It was accompanied throughout its course by fair weather and light winds, excepting over the Lake region on the 22d, when light snows occurred and the wind attained maximum velocities of thirty-five miles, due to the influence of an area of low pressure then central over the New England States; also by a cold wave, which caused a fall of 30° in twenty-four hours on the 21st over eastern Montana, northern Dakota, and Minnesota, and, on the morning of the 23d, over northern Michigan, the temperature going below zero. The wave became somewhat less marked as it moved southeastward over the upper Mississippi valley, the Lake region, the Ohio Valley, and the middle Atlantic states. On the morning of the 23d freezing temperatures were experienced as far south as Montgomery, Ala., Atlanta and Savannah, Ga. The lowest temperature of the month occurred at nearly all stations in the upper Mississippi valley on the 22d; over the upper lake region, the Ohio Valley and Tennessee, the south Atlantic and east Gulf states on the 22d and 23d.

V.—This area of high pressure developed after the 7 a. m. observation of the 23d on the northern border of the area just described. Its centre was apparently located north of Lake Superior, where it remained until the afternoon of the 24th, the area having gradually extended to the coast of the middle Atlantic states. After this its movement was to the southeast until central on the coast of New Jersey, then to the northeast, the pressure increasing from 30.5, which had been maintained from the time of its formation, to 30.6, and it passed to the Gulf of Saint Lawrence after 3 p. m. of the 27th. Light snows occurred in the southern part of the area over the lower Lake region, the Ohio Valley, Pennsylvania, and New York during the 23d and 24th, probably caused by two areas of low pressure, one central over the lower Saint Lawrence valley and the other over Texas. Only slight changes of temperature occurred over the first portion of its course, and a fall of only 10° was noted over the New England States.

VI.—The morning chart of the 26th shows an area of high pressure central in Montana, and extending southward over the northern and middle slopes of the Rocky Mountains, the central pressure inclosed by the isobar of 30.5. The area moved to the southeast, the pressure at the centre steadily decreasing,

falling slightly below the normal while over the Ohio Valley on the 28th, after which it increased, being 30.3 when the area passed off the south Atlantic coast on the 30th. Light snow was of frequent occurrence within the eastern limits of the area, and it was accompanied by a slight fall of temperature over the northern and middle slopes of the Rocky Mountains, and the greatest fall occurred over a limited area embracing southwest Missouri and northwest Arkansas, which was about 20°, and reached the freezing point.

AREAS OF LOW PRESSURE.

Nine well-defined areas of low pressure have been traced during March, 1888, over the territory covered by tri-daily observations. These tracks (see chart number i) as a general thing conform to the usual direction of low areas. Two of the areas originated in the Gulf of Mexico, off the coast of Texas, and moved in a northeasterly direction; one, described below as number iv, developed over the south Atlantic states and moved in a northeasterly direction along the coast, displaying remarkable energy; one moved from the north Pacific coast to the southeast, changing direction to northeast when near the thirty-fifth parallel; the remaining five were first observed to the north of Montana, one moving eastward, the other four moving first to the southeast changed direction to the westward, then resumed the southeast movement till near the thirty-fifth parallel, when the direction again changed to the northeast.

The following table shows the latitude and longitude in which each area was first and last observed, the lowest pressure observed within each area, and the average velocity in miles per hour:

Number of area.	First observed.		Last observed.		Lowest observed barometer reading.	Average hourly velocity.
	Lat. N.	Long. W.	Lat. N.	Long. W.		
	° ′	° ′	° ′	° ′	Inches.	Miles.
I	50 50	115 00	40 20	70 50	29.34	33.3
II	26 00	96 00	33 00	77 30	29.74	40.6
III	44 30	123 00	47 00	77 50	29.50	29.3
IV	34 20	82 20	40 00	71 00	28.92	16.6
V	52 00	106 30	47 00	65 00	29.06	35.8
VI	52 00	114 00	47 45	87 00	29.42	41.9
VII	51 00	114 00	47 00	84 00	29.36	34.0
VIII	27 00	94 30	49 45	63 00	29.28	33.3
IX	52 30	113 00	47 30	59 00	29.54	45.6

Average rate of progress, 34.5 miles per hour.

The following is a brief description of each area, with the marked weather conditions prevailing during each:

I.—On the 10 p. m. chart of February 26th, the advance isobar of this area of low pressure appeared over western Montana and Washington Territory. The area moved eastward, at the same time extending rapidly southward, until between the one hundred and second and one hundred and seventh meridians, when its path changed to the southwest. It was central near Salt Lake City, Utah, on the morning of the 28th, and moved slowly and irregularly to the southward until near the thirty-fifth parallel, when its course was changed to the northeast. From the upper lake region it moved to the east, and passed off the coast of the New England States on the morning of March 3d. The pressure at the center fell to 29.34 at 3 p. m. of the 27th, but increased to 29.5 at the succeeding observation, remaining steady until the storm started to the northeast, when the pressure increased to 29.9. It was accompanied by fair weather on the 27th and 28th, and on the 29th light snow occurred over the northern slope of the Rocky Mountains. On the morning of the 1st rains were general over the lower Missouri valley, the upper Mississippi valley, the Ohio Valley, and the Lake region, except in Minnesota, northern Wisconsin, and northern Michigan, where snow fell. Rain and snow continued during the 2d over the upper Mississippi valley, the Ohio Valley, and the Lake region, and began over the middle Atlantic and New England States. During the 3d snow continued over the lower lake region, New York, and New England. On February 27th a remarkable rise in temperature of from 20° to [illegible] in twenty-four hours occurred over the northern and middle [ing obse] [illegible] of the Rocky Mountains. At Valentine, N[illegible] [to fall rapidly d] the rise in temperature [at 10 p. m. The wind wa]

amounted to 52° in eight hours. The warm wave moved to the southeast during the 28th and 29th, causing a rise in temperature of from 20° to 30° over the central valleys. The temperature over the Lake region changed but slightly during the passage of the storm. The winds were generally light, excepting over the Lakes and on the New England coast on the 2d and 3d, where they reached velocities of from thirty to forty-five miles.

II.—On the morning chart of the 4th an area of low pressure was apparently central off the coast of Texas. It moved in a northeasterly direction and passed to the ocean from the coast of the south Atlantic states at 3 p. m. of the 5th. The pressure at the centre remained near 29.9, but decreased as the area approached the coast, the lowest pressure observed being 29.74. The heavy rains which occurred in eastern Texas and Louisiana on the afternoon and night of the 3d were probably caused by the approach from the Gulf of this area of low pressure. The following heavy rainfalls were reported: 3d, 3 p. m., Palestine, Tex., 3.04; 3d, 10 p. m., Palestine, Tex., 1.46; Shreveport, La., 1.42; 4th, 7 a. m., Vicksburg, Miss., 1.50; 4th, 3 p. m., Palestine, 1.02; the total rainfall for the storm being for Palestine, 6.52; for Shreveport, 3.88, and for Vicksburg, 3.44. It was attended by light winds and no change in temperature.

III.—This storm was central on the afternoon of the 7th over southwestern Idaho, and covered all of the United States to the west of the Rocky Mountains. It moved to the southeast, maintaining a pressure of 29.6 until near the thirty-fifth parallel, when the direction of movement changed to the northeast, and the pressure at the centre increased to 29.8. The 7 a. m. chart of March 11th shows a secondary depression (hereafter described as number iv) to have developed within the southern part of this area of low pressure. It disappeared to the northward after the 3 p. m. observation of the 11th. It was accompanied by rains over the Pacific slope and southern plateau on the 8th, by very light local snows over the middle and southern slopes of the Rocky Mountains on the 9th, and by general rain over the upper Mississippi valley, the Ohio Valley, and the Lake region on the 10th and 11th, except at the most northerly stations of the Lake district, where snow fell. The winds within the area were generally light, excepting over the Lake region on the night of the 10th and 11th, when velocities of from twenty-five to thirty-five miles were attained. A slight rise in temperature attended the movement of the area eastward, the greatest rise occurring over Kansas and Nebraska on the morning of the 8th, when it amounted to 30° in twenty-four hours. The increase of temperature over the central valleys was generally not more than 10°, but at northern stations in the upper lake region amounted to 20° in twenty-four hours.

IV.—The most severe storm of the month, and the most violent that has occurred in the eastern portion of the United States for a number of years, was first observed as a feeble cyclonic disturbance central in northern Georgia on the morning of the 11th, although the barometric disturbance within which this storm developed had its origin in the north Pacific, where it was observed on the 6th. The 7 a. m. report of the 10th exhibited an extended barometric trough, covering the central valleys, within which heavy rains were reported from the Gulf coast northward to Lake Superior, while areas of high pressure covered the Atlantic coast and the northern Rocky Mountain regions. This barometric trough moved slowly eastward during the 10th, causing unusually heavy rains in the Southern States, and rain, followed by snow, in the Lake region and Ohio Valley. The anti-cyclone which followed quickly the passage of this barometric trough over the central valleys was attended by a cold wave, causing marked and sudden changes in temperature within a few hours after the wind shifted to northwest. These contrasts of temperature are indicated by reports on the afternoon of the 10th, as follows: Cairo, Ill., 50°; Springfield, Mo., 24°; Memphis, Tenn., 64°; Fort Gibson, Ind. T., 32°; Chicago, Ill., 44°; Keokuk, Iowa, 22°. These thermal conditions existed when the barometric trough extended from

Louisiana northward to Lake Superior, the barometer being lowest over Lake Michigan, where the primary storm was at that time central. During the 11th the northern cyclonic disturbance moved northeastward and disappeared beyond the limits of the stations of observation, while the secondary disturbance moved eastward towards Cape Hatteras, N. C., and thence northeastward along the middle Atlantic coast, as indicated by the accompanying charts. As the centre approached the coast it developed great energy, causing destructive gales, which were attended by heavy rains southward of Virginia, and rain, turning to snow, from Virginia northward over the middle Atlantic states and New England. The accompanying table shows for stations east of the Mississippi the minimum barometer reported during this storm, the amount of precipitation for each day from the 11th to 14th, the direction and maximum velocity of wind, together with the total movement for the month and for the four days of the storm:

Stations.	Min. bar.		Rainfall.					Maximum wind velocity, and direction.								Wind movement of 4 days, 11–14th.	Wind movement for March.	Per cent.
								11th.		12th.		13th.		14th.				
	Height.	Date.	11th.	12th.	13th.	14th.	Total.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.			
																Miles.	*Miles.*	
Eastport	29.51	13	0.00	0.00	0.21	0.14	0.35	e.	16	e.	56	e.	72	e.	40	2,529	9,724	26
Portland	29.32	13	T.	0.47	0.22	T.	0.69	se.	19	ne.	36	ne.	42	n.	23	1,588	6,764	23
Boston	29.09	12	0.00	0.72	0.30	0.32	1.24	ne.	25	n.	54	e.	60	n.	34	2,212	11,433	19
Nantucket	28.93	12	0.00	0.55	0.08	0.05	0.68	se.	26	se.	54	s.	34	ne.	26	1,713	9,601	18
Block Island	28.92	13	0.02	0.88	0.08	0.02	1.00	e.	44	e.	70	n.	50	ne.	38	2,992	15,044	20
New London	29.05	13	0.03	1.88	0.22	0.04	2.17	se.	36	n.	46	n.	36	n.	18	1,474	7,253	20
New Haven	29.23	13	0.97	2.80	1.53	0.10	4.50	se.	26	n.	48	n.	45	n.	26	1,884	8,070	23
Wood's Holl	28.92	12	T.	1.17	T.	0.10	1.27	se.	20	ne.	36	se.	36	ne.	24	1,757	13,947	13
Northfield	29.54	13	0.09	1.46	0.67	0.00	2.22	s.	26	n.	40	n.	39	n.	26	1,582	8,573	18
Manchester	29.22	13	0.01	1.20	0.50	0.34	2.05	se.	14	ne.	28	ne.	28	ne.	20	1,063	6,838	16
Albany	29.53	13	0.28	2.29	0.93	0.13	3.63	s.	24	nw.	26	nw.	30	n.	24	1,341	6,716	20
New York City	29.40	13	0.40	1.58	0.35	0.13	2.46	ne.	21	w.	48	w.	50	nw.	24	2,189	10,470	21
Atlantic City	29.57	13	0.55	0.66	T.	0.02	1.23	e.	23	nw.	60	nw.	48	nw.	30	2,526	9,873	26
Philadelphia	29.61	13	1.25	1.27	T.	0.02	2.54	n.	24	nw.	60	nw.	56	nw.	37	2,552	10,586	24
Baltimore	29.71	13	1.58	0.06	T.	T.	1.64	nw.	24	nw. nw.	33	nw.	32	nw.	24	1,474	5,495	27
Washington	29.75	13	1.65	T.	T.	T.	1.65	nw.	30	nw.	36	nw.	42	nw.	26	1,837	6,152	30
Norfolk	29.92	13	0.97	0.00	0.00	T.	0.97	nw.	55	nw.	54	w.	46	w.	29	2,201	7,929	28
Lynchburg	29.80	13	1.69	0.00	0.00	0.00	1.69	nw.	24	nw.	36	nw.	24	nw.	29	1,189	3,907	30
Hatteras	29.76	13	1.78	0.00	0.00	0.00	1.78	nw.	55	nw.	60	w.	37	nw.	42	2,292	12,352	19
Wilmington	29.69	11	1.45	0.00	0.00	0.00	1.45	s.	24	nw. nw.	19	nw.	24	nw.	24	1,168	6,587	18
Charlotte	29.87	13	0.97	0.00	0.00	0.00	0.97	nw.	30	nw.	24	nw.	30	ne.	24	.....	.....	..
Atlanta	29.90	11	0.24	0.00	0.00	0.00	0.24	n.	35	n.	30	nw.	28	nw.	20	.....	.....	..
Augusta	29.84	11	0.30	T.	0.00	T.	0.30	nw.	22	w.	10	w.	18	nw.	15	.....	.....	..
Charleston	29.78	11	0.70	0.00	0.00	0.00	0.70	s.	27	nw.	24	nw.	24	nw.	23	.....	.....	..
Savannah*	29.83	11	0.08	0.00	0.00	0.00	0.08	nw.	34	nw.	35	nw.	24	nw.	20	.....	.....	..
Jacksonville	29.85	11	0.42	0.00	0.00	0.00	0.42	nw.	26	nw.	24	w.	22	nw.	18	.....	.....	..
Raleigh	29.78	11	1.31	0.00	0.00	0.00	1.31	nw.	30	nw.	24	nw.	30	nw.	24	.....	.....	..
Cedar Keys	29.91	11	0.26	0.00	0.00	0.00	0.26	nw.	30	nw. ne.	29	nw.	19	w.	20	.....	.....	..
Key West	29.94	11	0.62	0.02	0.00	0.00	0.64	w.	27	n.	35	n.	22	n.	21	.....	.....	..
Titusville	29.88	11	1.25	0.00	0.00	0.00	1.25	s.	26	n.	30	nw.	10	nw.	20	.....	.....	..
Point Jupiter	29.88	11	0.64	0.00	0.00	0.00	0.64	se.	23	n.	26	nw.	18	nw.	18	.....	.....	..
Montgomery*	29.98	11	0.31	0.00	0.00	0.00	0.31	nw.	30	n.	16	w.	14	nw.	12	.....	.....	..
Pensacola†	29.99	11	0.06	0.00	0.00	0.00	0.06	n.	30	n.	24	sw.	24	n.	14	.....	.....	..
Mobile	30.09	11	0.00	0.00	0.00	0.00	0.00	n.	36	n.	26	s.	18	n.	15	.....	.....	..
Vicksburg	30.17	13	0.00	0.00	0.00	0.00	0.00	n.	33	w.	11	w.	15	e.	14	.....	.....	..
New Orleans	30.12	11	0.02	0.00	0.00	0.00	0.02	n.	32	n.	24	nw.	11	w.	10	.....	.....	..
Nashville	30.15	13	0.46	T.	0.00	T.	0.46	nw.	27	nw.	15	nw.	12	n.	15	.....	.....	..
Memphis	30.12	13	0.01	0.00	0.00	0.00	0.01	nw.	36	w.	12	nw.	15	ne.	12	.....	.....	..
Chattanooga	30.11	13	0.39	T.	T.	T.	0.39	n.	42	nw.	23	nw.	18	n.	15	.....	.....	..
Knoxville	29.99	11	0.73	T.	T.	T.	0.73	n.	24	nw.	13	nw.	16	n.	12	.....	.....	..
Pittsburg	29.86	11	0.55	0.02	0.02	0.03	0.62	s.	25	nw.	18	nw.	30	nw.	13	.....	.....	..
Columbus	29.96	11	0.34	0.00	T.	0.00	0.34	w.	28	w.	24	nw.	24	n.	22	.....	.....	..
Indianapolis	30.18	11	0.06	0.00	0.00	T.	0.06	nw.	25	w.	18	n.	16	n.	18	.....	.....	..
Cincinnati	30.09	11	0.17	0.00	0.00	0.00	0.17	nw.	25	ne.	24	n.	25	n.	19	.....	.....	..
Louisville	30.19	11	0.22	0.00	0.06	0.00	0.28	w.	32	w.	23	n.	16	n.	22	.....	.....	..
Lexington	.....	..	0.62	0.00	0.00	0.00	0.62	nw.	26	w.	18	n.	17	n.	15	.....	.....	..
Cairo	30.17	13	0.00	0.00	0.00	0.00	0.00	w.	24	w.	11	nw.	23	n. nw.	20	.....	.....	..
Detroit	29.84	11	0.18	0.00	T.	T.	0.18	nw.	28	nw.	24	n.	26	n.	26	.....	.....	..
Toledo	29.96	11	0.13	0.00	0.00	0.00	0.13	nw.	36	nw.	28	nw.	32	nw.	26	.....	.....	..
Sandusky	29.94	11	0.17	0.00	T.	T.	0.17	n.	43	nw.	41	nw.	37	n.	36	.....	.....	..
Cleveland	29.87	11	0.18	T.	0.24	0.04	0.46	s.	30	n.	29	nw.	27	n.	20	.....	.....	..
Erie	29.90	11	0.35	0.03	0.08	0.01	0.47	s.	32	nw.	20	n.	26	w.	15	.....	.....	..
Buffalo	29.83	11	0.29	0.01	0.07	0.06	0.43	sw.	40	nw.	26	nw.	28	nw.	20	.....	.....	..
Rochester	29.90	13	0.16	0.02	0.54	0.20	0.92	s.	32	nw.	34	nw.	33	nw.	20	.....	.....	..
Oswego	29.84	13	0.14	T.	0.04	T.	0.18	w.	30	n.	33	n.	39	n.	24	.....	.....	..
Duluth	30.25	14	0.00	0.00	0.00	0.00	0.00	se. nw.	15	ne.	22	ne.	14	ne.	9	.....	.....	..
Marquette	30.14	11	T.	0.00	T.	0.00	T.	nw.	34	nw.	20	nw.	9	nw.	10	.....	.....	..
Milwaukee	30.23	11	0.06	0.00	0.00	0.00	0.06	nw.	36	ne. n.	15	n.	24	n.	15	.....	.....	..
Chicago	30.25	11	0.03	0.00	0.00	0.00	0.03	nw.	24	nw.	17	ne.	18	ne.	17	.....	.....	..
Grand Haven	30.04	11	0.04	0.00	0.00	0.00	0.04	nw.	37	n.	21	n.	21	n.	15	.....	.....	..
Mackinaw City	29.98	11	0.05	T.	T.	0.00	0.05	w.	34	w.	20	nw.	17	nw.	10	.....	.....	..
Alpena	29.87	11	0.06	0.00	T.	T.	0.06	w.	36	w.	21	w.	28	nw.	24	.....	.....	..
Port Huron	29.85	11	0.37	0.00	0.01	0.02	0.40	nw.	36	nw.	34	n.	37	nw.	36	.....	.....	..
Lansing	30.03	11	0.11	0.00	0.00	0.00	0.11	nw.	34	w. nw.	17	n.	20	n.	16	.....	.....	..
Green Bay	30.23	11	0.05	0.00	0.00	0.00	0.05	w. nw.	24	n.	12	n.	12	n.	7	.....	.....	..

NOTE.—At Sandy Hook, N. J., the estimated velocity of wind was 90 miles per hour.
*1.09 inches of rain fell on the 10th. †4.05 inches of rain fell on the 10th.

The accompanying charts exhibit the barometric conditions existing at each of the tri-daily reports during the prevalence of the storm. With the addition of marine reports the centre of this storm has been traced from eastern North Carolina northward to eastern Massachusetts, where it apparently attained its maximum energy. The succeeding reports show that after the morning of the 13th there was an extension of the low area to the eastward.

When this disturbance reached the Atlantic coast, on the afternoon of the 11th, two well-defined barometric depressions were observed, one central near Wilmington, N. C., and the other central to the north of Lake Ontario, the minimum barometer observed in each being respectively 29.68 and 29.70. These disturbances were followed by an area of high pressure which extended from the Gulf coast to British America, causing cold northerly winds from the Mississippi and Ohio valleys to the Lake region. During the night of the 13th the storm-centre passed to the east of the coast line, near Hatteras, N. C., attended by the most severe gales that have occurred during recent years on the North Carolina coast. The wind remained southeasterly at Hatteras and Kitty Hawk, N. C., until about 8 p. m., when it shifted to the northwest, with increasing force. After the centre passed over the Atlantic it apparently moved northward, becoming very contracted, and the bounding isobars changing from an elliptical to a circular form as it approached the New England coast. The heavy snows and high winds attending this disturbance caused interruption to telegraphic communication throughout the middle Atlantic and New England states, the Signal Service being unable to receive its regular tri-daily reports from the 11th until the 15th. Railway communication was generally interrupted during the 12th, 13th, and 14th, in New York, New England, and eastern Pennsylvania. After the centre reached eastern Massachusetts the barometer rose rapidly to the westward, while the marine reports indicate that the disturbance extended eastward over the Atlantic. A secondary disturbance, however, formed on the southern New England coast, and remained almost stationary during the 13th, thus accounting for the persistence of the storm and the brisk and high southeasterly winds in the east portion of Long Island, while strong westerly winds continued on the New York and New Jersey coasts. This secondary disturbance apparently passed eastward on the 14th and united with the ocean storm, near N. 42°, W. 60°, on the morning of the 15th, after which the general direction of movement was to the northeastward over the north Atlantic, attended by continuous gales until the 19th, when it was last observed in N. 56°, W. 27°.

Table showing maximum barometric gradient occurring during the storm.

Station.	Barometer.	Range.	Distance.	Gradient.
Block Island	28.92	.....	.....	.....
New London	29.05	0.13 inch.	32 miles	6.3 or 0.41 inch to 100 miles.
New Haven	29.23	0.51 inch.	71 miles	6.6 or 0.44 inch to 100 miles.
New York	29.44	0.52 inch.	129 miles	6.3 or 0.41 inch to 100 miles.
Albany	29.58	0.66 inch.	154 miles	6.5 or 0.43 inch to 100 miles.
Erie	30.20	1.28 inch.	446 miles	4.4 or 0.29 inch to 100 miles.

The following notes, made by Signal Service observers, serve to illustrate the extent and severity of this storm:

Hatteras, N. C., 11th: light rain during morning and very heavy rain, with high wind, in the afternoon; 1.40 inches of rain fell between 4 and 5.20 p. m., and a wind velocity of sixty miles occurred at 10:30 p. m.; very high tide, nearly submerging the island.

Chicamicomico, N. C., 11th: light southeasterly winds in morning, increasing to gale at 5 p. m.; calmed at 8 p. m., and afterwards backed to northwest and increased to strong gale, which continued throughout the 12th.

Norfolk, Va., 11th: at 6.45 p. m. the wind shifted to northwest and a furious gale set in from that quarter and continued without abatement throughout the 12th, the wind reaching a maximum velocity of sixty miles per hour. This storm was one of the most violent that has occurred here since the memorable storm of 1879. Many vessels at anchor in this harbor were blown ashore and wrecked; at Hampton Roads a sloop was capsized and all on board perished.

Cape Henry, Va., 11th: southeast wind prevailed until 7.15 p. m., when it suddenly shifted to northwest and [illegible] with great violence; the storm continued during the 12th with unab[illegible]

Baltimore, Md., 11th: light r[illegible]on, then heavy rain

until 6.50 p. m., when it changed to snow, accompanied by high northwest wind; in a short time telegraphic communication was cut off with nearly all points. The snow storm ended during the night of the 11-12th and was followed by cold weather, the wind continuing from northwest throughout the 12th (the maximum velocity being thirty-three miles per hour) causing the lowest tide for many years, the bottom of the harbor being exposed in many places. This severe storm caused an almost entire suspension of business on the 12th. Reports from the surrounding country and from Chesapeake Bay show the storm to have been very severe, and many vessels arriving on the 14th and 15th reported having experienced remarkably rough weather. The tide in Baltimore harbor did not resume its normal height until the 16th.

Atlantic City, N. J., 11th: rapidly falling barometer and brisk east wind in the afternoon; rain began at 3.10 p. m., and during the night of the 11-12th turned to snow, the wind changing to northwest, and at 1 a. m. increased to a gale which continued until the morning of the 14th. The sloops "Neptune" and "Alert" were blown from their anchorage and sunk. The heavy snow caused delay of trains.

Philadelphia, Pa., 11th: light rain began at 8.45 a. m., and during the evening changed to heavy rain; wind, northeast; barometer falling rapidly; at 11.15 p. m. the heavy rain changed to snow; wind, north. The storm continued with great severity during the night of the 11-12th, the fierce north wind, blinding snow, and rapidly falling temperature causing suspension of street railway traffic. Throughout the day the wind velocity ranged from thirty to sixty miles per hour, the maximum occurring at 10.30 a. m. The most enterprising street railway companies were unable to resume traffic until noon of the 13th. At the Breakwater, out of forty vessels in the harbor on the 11th, only thirteen escaped damage or destruction, and thirty or more lives were lost. The damage sustained by the Breakwater and to marine interests is estimated at half a million dollars, but, vast as is this sum, it becomes inconsiderable when compared with the losses sustained by the several railroad companies, the least part of which, although great, being the prolonged interruption to travel. This storm is considered the most disastrous that has ever visited this locality.

New York City, 11th: cloudy in the morning; light rain in afternoon and evening; at 12.10 a. m. on the 12th rain changed to snow which continued throughout the day, accompanied by high northwest winds, reaching a velocity of forty-eight miles per hour. Travel by street railway was entirely suspended by 7 a. m., and at some points the snow drifts were from fifteen to twenty feet deep. On the 13th light snow fell in the early morning and at intervals during the afternoon and evening, accompanied by high westerly winds. This storm is generally considered the severest ever experienced here.

Albany, N. Y., 11th: rapidly falling barometer with brisk south wind backing to westerly, and flurries of snow during the day. Heavy snow fell during the night of the 11-12th, and drifted so as to render travelling difficult. At 7 p. m. snow drifts were from three to four feet deep, and after 10 p. m. it was dangerous for persons to venture out of doors. The storm continued on the 13th, but with less violence, and ended on the morning of the 14th. Nearly forty-seven inches of snow fell during the storm.

Oswego, N. Y., 11th: rain, snow, and sleet prevailed at intervals until 3.40 p. m., when steady snow set in and continued at intervals until the night of the 13-14th, the wind reaching a maximum velocity of thirty-nine miles per hour at 10 p. m. on the 13th. The snow was badly drifted by high winds, resulting in delay of railway trains.

New Haven, Conn., 11th: barometer fell steadily all day; snow began at 3.30 p. m., changing to rain at 7.45, and to sleet before midnight; during the night sleet changed to snow, which fell heavily throughout the 12th, accompanied by high north wind, maintaining a velocity of about thirty-six miles per hour all day and occasionally blowing in gusts of sixty miles per hour. At Light-House Point the wind-velocity was estimated at seventy miles per hour. Telegraphic communication with New York City was cut off and travel of all kinds interrupted. The storm continued until the morning of the 13th, on which date the streets of New Haven were utterly impassable and business was suspended. The storm caused much suffering and the police rescued many exhausted persons from snow-drifts in the heart of the city. The first train since the 12th arrived on the afternoon of the 14th. The total depth of snow during the storm was forty-four inches.

New London, Conn., 12th: rain and sleet fell in the afternoon, changing to snow at 4 p. m., accompanied by furious gale, making travel almost impossible and very dangerous. All railroads to the west were blockaded in the morning and in the afternoon those to the east were also blockaded and telegraph lines were prostrated. The barometer fell rapidly during the day, and at night read 29.10. Snow continued until 11.20 p. m. on the 13th, when some drifts were from eight to ten feet deep. Trains from the east arrived, and the New York steamers resumed their regular trips on the 14th.

Block Island, R. I., 11th: cloudy nearly all day, with light rain from 8 to 9.45 p. m.; southeast winds until evening, when a heavy gale set in, maximum velocity, forty-four miles; falling barometer. 12th, light rain began during the night and fell steadily until 5.45 p. m., when it changed to snow and sleet; at the same time the wind shifted from east to north, without decreasing much in force, a terrific gale having blown all day, with a maximum velocity of seventy miles east; the barometer (reduced) at 10 p. m. read 28.99. The storm continued until the afternoon of the 13th, the wind subsiding about noon and the snow ending at 4 p. m.

Boston, Mass., 12th: at the morning observation the barometer showed a decided fall, and it continued to fall rapidly during the day, ranging from 29.83 at 7 p. m. to 29.09 at 10 p. m. The wind was north or northeast, blowing in heavy gales, reaching a maximum velocity of fifty-four miles north between 4 and 5 p. m. Light rain began about 6 a. m. and turned to snow at 7.15 and lasted all day. 13th, the barometer showed a slight rise at 7 a. m. and continued to rise all day, with strong northeast and east gales, reaching a velocity of sixty miles. All railroads were blockaded and telegraph communication was cut off. 14th, wind backed from northeast to northwest, moderate in force; maximum velocity thirty-four miles; trains still unable to move; many vessels left port in the afternoon. Reports show that the storm was of unusual severity at points south and west of here.

Portland, Me., 12th: brisk to high east shifting to northeast winds, with light to heavy snow; maximum wind velocity, forty-two miles northeast, at 10 p. m.; this was one of the severest storms of the winter at this place and rendered travelling difficult. Telegraph lines were prostrated and railroads blocked. High southeast and east winds continued on the 13th.

Eastport, Me., 12th; rapidly falling barometer; gale began at 9.05 a. m. and continued until early a. m of the 14th, reaching its maximum velocity, seventy-two miles east, at 6.18 a. m. on the 13th. This was the most severe storm that has occurred here since April, 1873.

The following interesting report concerning this storm has been furnished by Professor Upton:

PROVIDENCE, R. I., *April* 20, 1888.

The CHIEF SIGNAL OFFICER,
Washington, D. C.

DEAR SIR: I have the honor to communicate to you the following summary of my study of the storm of March 11–14th, in advance of its publication, that you may make whatever use you wish of it in the preparation of the MONTHLY WEATHER REVIEW:

1. *Path of the storm.*—By charting the barometric and wind reports from New England and from vessels off the coast, I find that the centre was near Martha's Vineyard, March 12th, 10 p. m., then moved northwestward, and that the cyclone ceased to have a definite existence on the 14th over Connecticut. This path I ascribe to the main centre itself rather than to an offshoot, as I can find no indication of the continued advance of the storm-centre, except as above, from the ship reports at hand, kindly transmitted to me by the U. S. Hydrographic Office. It is probable, however, that a second centre formed off the coast on the 14th, as the barometric indications in the afternoon of that day point to a low area in the ocean. I beg leave to inclose maps showing the isobars drawn for the important times illustrating the above paths.

2. *Cold wave.*—The above deflection was due to the simultaneous arrival in New England of a cold wave, which also ceased to maintain its independent existence over Connecticut. I add isotherms to the above maps, which illustrate this fact. From the deadly encounter of the cyclone and cold wave neither combatant recovered.

3. *Precipitation.*—This was exclusively snow in the western area, where the cold wave advanced, rain and snow in the eastern area. I have collected four hundred and twenty reports of the estimated depth of snow, from which the inclosed map is constructed. While the estimates of snow, so badly drifted (many drifts were twenty to forty feet high by actual measurement), are necessarily rough, I find a good agreement in neighboring estimates, some of which were made in the woods, and others confirmed by the large amount of water obtained by melting. I place, therefore, considerable confidence in the lines drawn, as showing, approximately, the distribution of the snow. Two maximum areas, in which the average depths of snow exceeded forty inches, are drawn. From the returns of rain and melted snow, I add to the map dotted lines showing the distribution of the total precipitation in the region east of the maximum snow area. I have not attempted to draw these lines in the region where the snow was heavy and badly drifted. The maximum reports of total precipitation are: Albany, 3.63 inches; New Haven, 4.50 inches; Wallingford, 5.47 inches; Middletown, 5.78 inches; and, also, for this region Setauket, Long Island, 3.85 inches; Hartford, 2.69 inches. The map shows a minimum snow area near Hartford.

The explanation of the excessive precipitation is probably the great cooling of air already saturated. A cooling of 26° Fahrenheit would cause the precipitation to be doubled, and this is found to be the case by comparing the precipitation where most excessive with that in the eastern part of the district where the air was but little affected by the cold wave.

I beg to ackowledge the courtesy shown in ordering the observers of the Signal Service to send me special reports of the storm. Any of the data which the New England Meteorological Society has collected is at your service. An article giving the results of our investigation, of which the above is a summary, will be published in the American Meteorological Journal for May.

I have the honor to remain,

Yours, very respectfully,

WINSLOW UPTON,
Secretary New England Meteorological Society.

Chart number v, showing the amount of snowfall, has been prepared by Professor Upton, and is of especial interest.

Fig. 1 indicates the barometric conditions within this storm at 10 p. m. of the 12th, as shown by a plane passing through the axis of the storm in a northeasterly direction. This section extends from Lynchburg, Va., to Halifax, N. S., and the curve shows the barometric readings along the line at the hour stated above.

Fig. 2 indicates a similar section at 7 a. m. of the 13th, cut by a plane passing through the axis of the storm in an east and west direction. This sharp curve serves to show the unusually steep barometric gradient which existed between Block Island and New York when the storm reached its maximum energy.

Figs. 3 and 4 represent sections of storm at 3 p. m. and 10 p. m. of the 13th, cut by a plane similar to that described in Fig. 2, and serve to indicate the formation of the slight depression which existed to the westward of the centre of the principal disturbance, as indicated by the previous 7 a. m. report.

Figs. 5, 6, and 7 represent barograms constructed from observations taken at New York, Block Island, and Boston, respectively, during the 11th, 12th, 13th, and 14th.

V.—During the 16th a decline in pressure over the northwest indicated the approach of an area of low pressure, which was central over Dakota at 7 a. m. of the 18th, the central pressure inclosed by the isobar of 29.4. It moved in a direction west of south, and at 10 p. m. was central over Colorado, Las Animas reporting a pressure of 29.06, the lowest that occurred during the disturbance. A trough of low pressure extended northeast to Lake Superior. A marked rise in temperature, ranging from 20° to 30° in twenty-four hours, occurred over the Missouri Valley, the upper Mississippi valley, the Lake region, and the Ohio Valley during the 18th, and the first precipitation of the storm was reported at 10 p. m. of that date from a few stations in the northern and middle slopes of the Rocky Mountains.

During the 19th the storm moved northeast to Lake Superior, accompanied by a still further rise in temperature over the Lake region and the Ohio Valley; rain became general within the limits of the area, continuing during the remainder of its course, and the pressure increased at the centre to 29.4. At 10 p. m. of the 20th the centre was located to the north of Lake Ontario, a trough of low pressure extended southward to Tennessee, and the area described as number vi was central over Lake Superior. The following chart shows that the two areas had combined into one area nearly circular in shape, central over Lake Erie; Erie, Pa., reporting a pressure of 29.14. Severe gales prevailed over the Lake region on the 20th, 21st, and 22d. It moved with increasing pressure slowly and irregularly northeastward to the Gulf of Saint Lawrence, causing severe gales along the middle Atlantic and New England coasts on the 22d and 23d. The maximum temperatures of the month occurred slightly in advance of this storm at most stations in Montana on the 17th; at all stations in Dakota on the 16th, 17th, and 18th; over Minnesota, except at Duluth, on the 18th; over northern Wyoming; over Nebraska, except at North Platte on the 17th and 18th; over Kansas, except at Dodge City, on the 18th; over the Ohio Valley north of the Ohio River, except at Cincinnati; and over the Lake region on the 19th and 20th; also at Knoxville, Tenn., on the 20th, at Lynchburg, Va., on the 21st, and at several stations in New England, on the 21st and 22d.

VI.—This area of low pressure was first observed on the afternoon of the 19th, extending southward over the northern slope of the Rocky Mountains. The area moved eastward, its centre remaining to the north of the region of observation until 10 p. m. of the 20th, when it was central over Lake Superior, and at the following observation it had combined with the area of low pressure described above as number v. It was attended by a slight rise in temperature over Montana, Dakota, and Minnesota. Fair weather prevailed within the area until 3 p. m. of the 20th, when light snows occurred in Minnesota. The wind attained velocities of from thirty to forty miles on the 20th.

VII.—This depression was central north of Montana at 3 p. m. of the 22d. It moved in a southeasterly direction until the afternoon of the 26th; when central near the thirty-third parallel the direction changed to northeast, and it passed to the northward of the region of observation after 10 p. m. of the 26th. The lowest pressure observed during the existence of the area was 29.36, at Fort Elliott, Tex., at 3 p. m. of the 24th, previous to which time the pressure at the centre had been near 29.7, and it subsequently increased to 29.6. The area was attended by fair weather and light winds over the Rocky Mountain districts during the 23d. On the afternoon and night of the 24th precipitation became general within its limits over the northern and middle slopes of the Rocky Mountains, the west Gulf states, the Missouri Valley, the Ohio Valley; and on the 25th over all districts east of the Mississippi River, except the New England States, and continued during the 26th. This precipitation was mostly in the form of rain, snow occurring at extreme northern stations of the United States. The temperature rose generally in advance of the area, the greatest rise being in the northwest, diminishing as the storm progressed eastward. The winds were light to fresh, except over the Lakes, where maximum velocities of thirty miles or more occurred.

VIII.—This depression apparently formed over the Gulf of Mexico on the edge of the preceding area. It moved rapidly to the northeast. At 3 p. m. of the 28th the isobar of 29.8 inclosed a narrow trough extending along the Appalachian Mountains from the Gulf of Mexico to the upper Saint Lawrence valley. Becoming nearly circular in shape the area passed to the Gulf of Saint Lawrence, the pressure having declined to 29.28 at Anticosti at 3 p. m. of the 29th. Rain, which had begun under the influence of the preceding area of low pressure, was continued over the eastern Gulf states, the south and middle Atlantic states, the upper Ohio valley, and the lower lake region from the 26th to the 29th, some stations in the eastern Gulf and south Atlantic states reporting unusually heavy rainfalls.

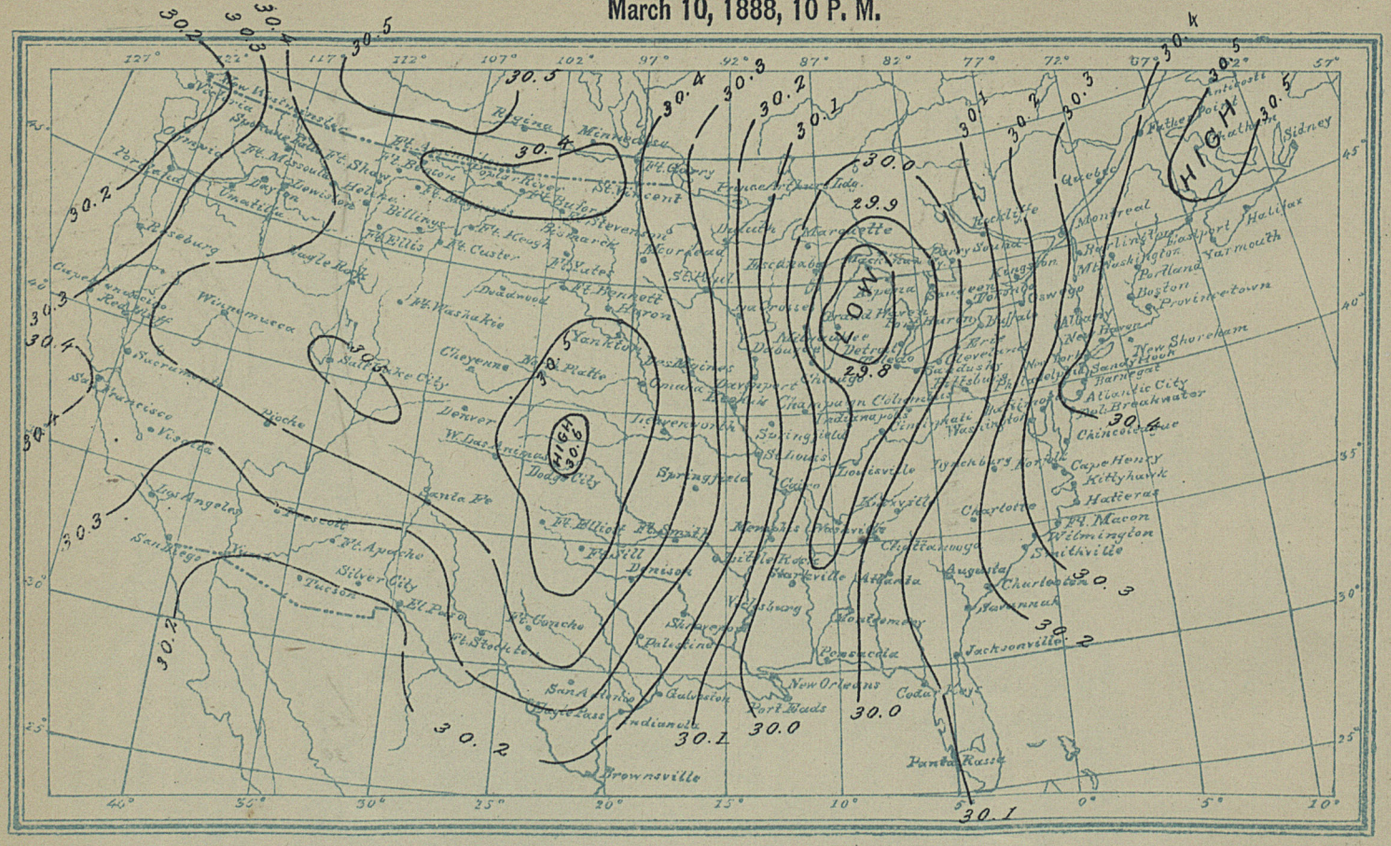
The following are some of the special rainfalls reported: 26th, 3 p. m., Pensacola, Fla., 2.14; Montgomery, Ala., 2.01; Atlanta, Ga., 1.10; Charleston, S. C., 0.60. 26th, 10 p. m., New Orleans, La., 1.02; Mobile, Ala., 0.82; Pensacola, Fla., 0.94; Charleston, S. C., 1.02. 27th, 7 a. m., Montgomery, Ala., 2.25. 27th, 3 p. m., Montgomery, Ala., 2.18; Atlanta, Ga., 1.40. 28th, 3 p. m., Atlanta, Ga., 1.14. 29th, 3 p. m., Raleigh, N. C., 1.01. The winds were generally light to fresh, but attained velocities of twenty-five to thirty miles on the coast of the south Atlantic states on the 29th. Only a slight rise in temperature occurred to the east of the Appalachian Mountains, while a fall of 10° to 20° occurred to the west, owing to the approach of a high area from that direction.

The maximum temperature of the month occurred at many stations in the south Atlantic and east Gulf states on the 28th and 29th.

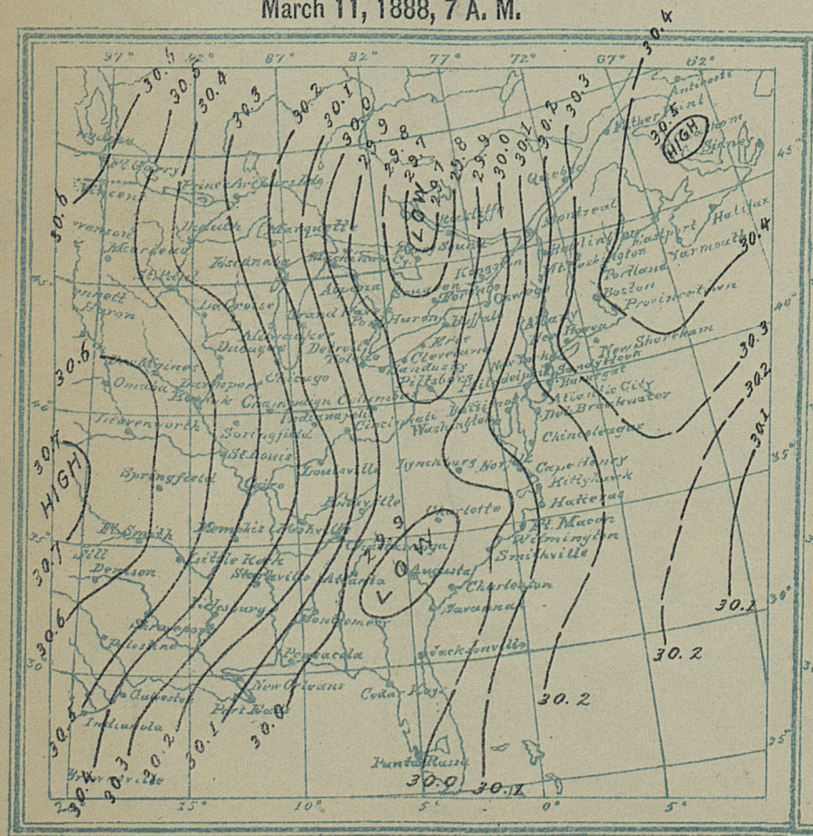
IX.—This area was apparently central to the north of Montana at 3 p. m. of the 27th. It moved to the southeast until central near the one hundred and fourth meridian when its path curved to the northwest, and the area was central near Spokane Falls, Wash., where the pressure was reported 29.54, the lowest during its continuance. From this position it again moved southeast, the central pressure increasing to 29.8, and the direction changed near the fortieth parallel to slightly north of east. It was accompanied by light winds, with occasional light snows, over the northern slope on the 27th and 28th. Precipitation was very light over the Ohio Valley, the Lake region, and the New England States. The temperature rose slightly in advance of the area, in only a few instances amounting to as much as 20° in twenty-four hours. During the prevalence of the area the maximum temperature of the month occurred at a number of stations along the Atlantic coast on the 31st.

Under the influence of an area of low pressure central on the coast of Washington Territory on the 31st (which will be described in the April REVIEW), the maximum temperature of the month occurred over southern Wyoming, Colorado, New Mexico, Indian Territory, Texas, except along the Gulf coast, Arkansas, and southern Missouri on the 31st. Fort Elliott, Tex., reported a higher maximum temperature than was ever before observed at that station in March.

March 10, 1888, 10 P. M.



March 11, 1888, 7 A. M.



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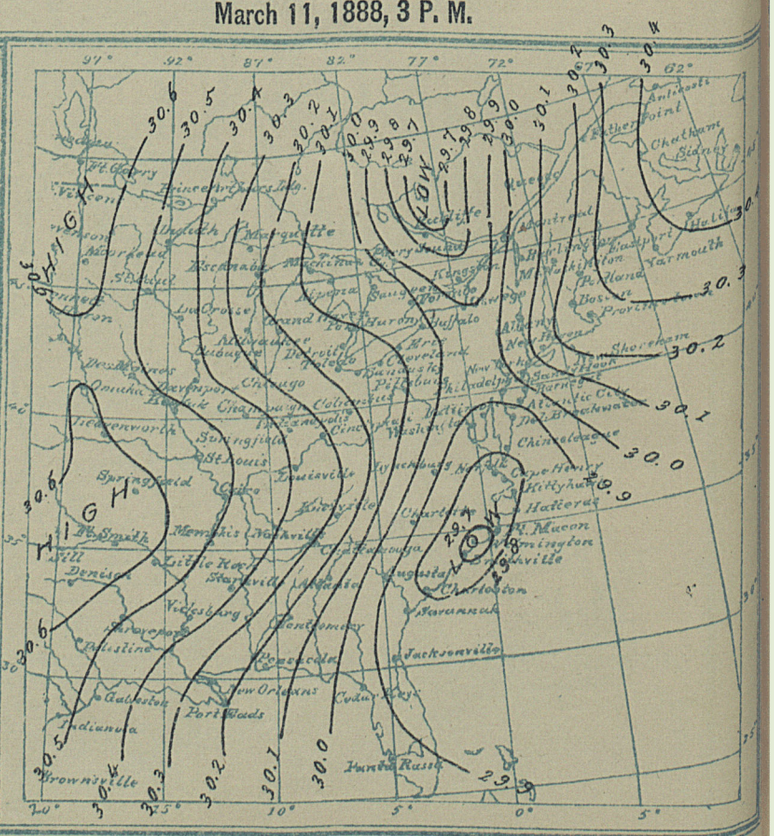

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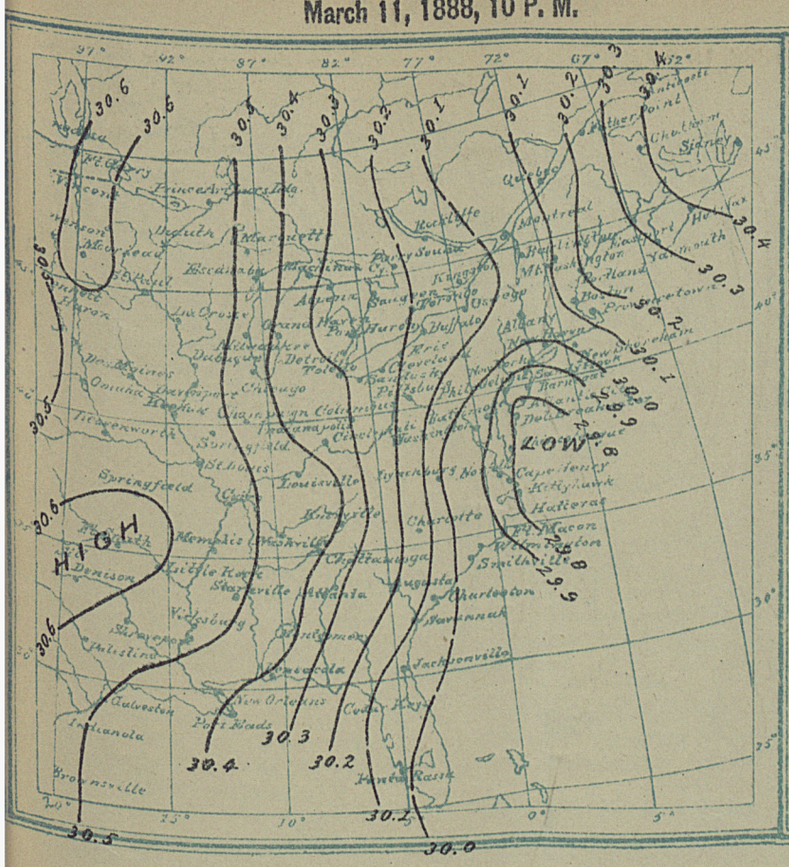
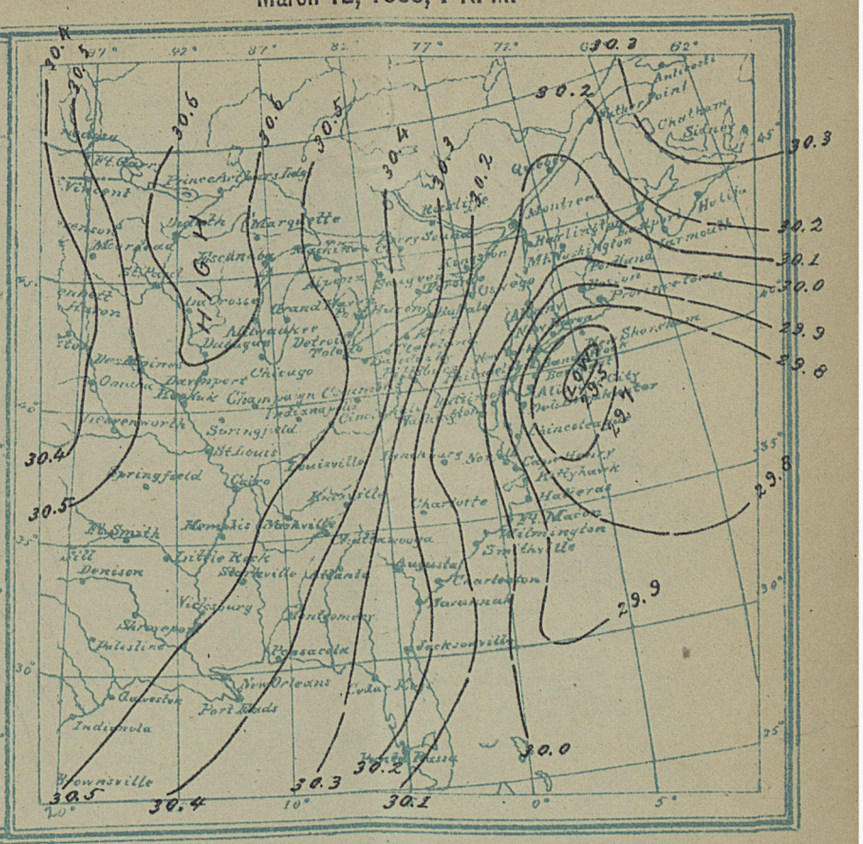
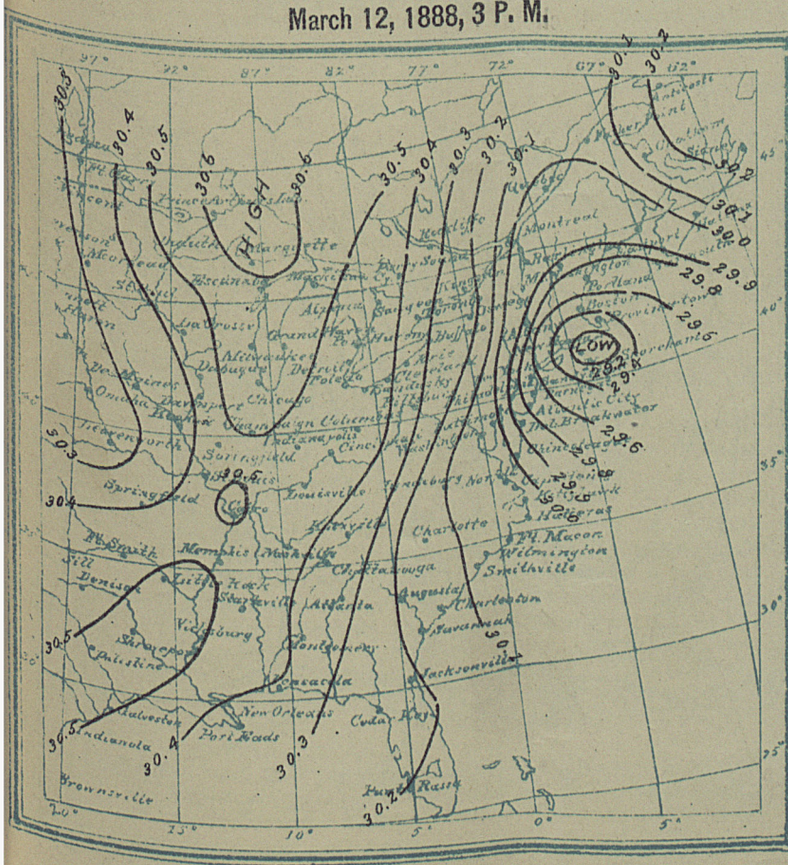


March 12, 1888, 7 A. M.



March 12, 1888, 3 P. M.



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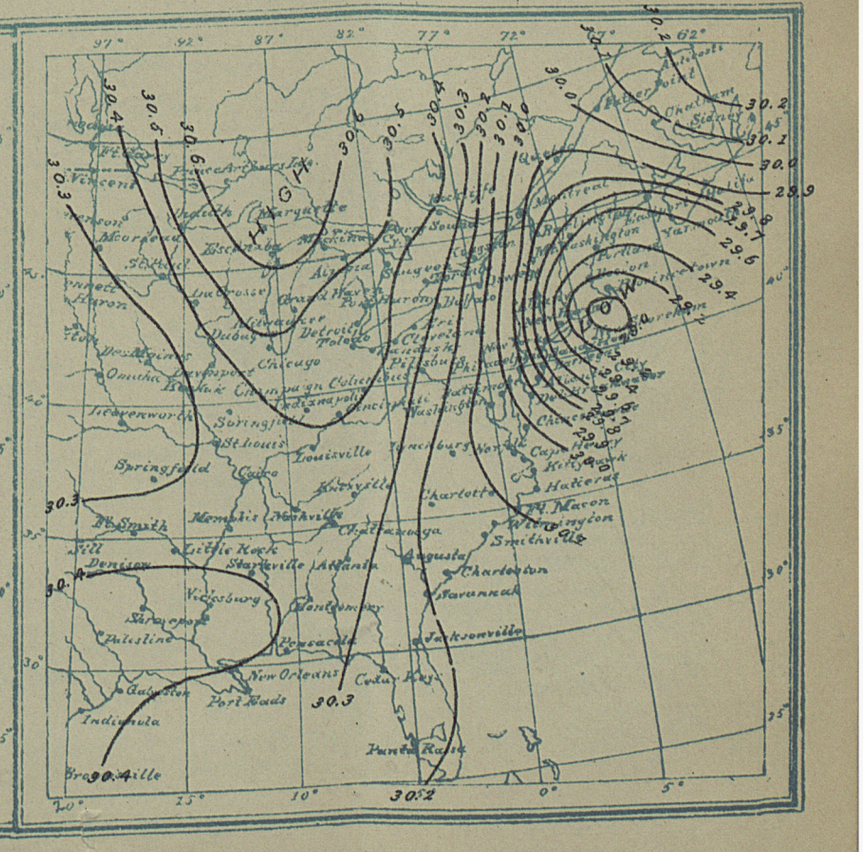
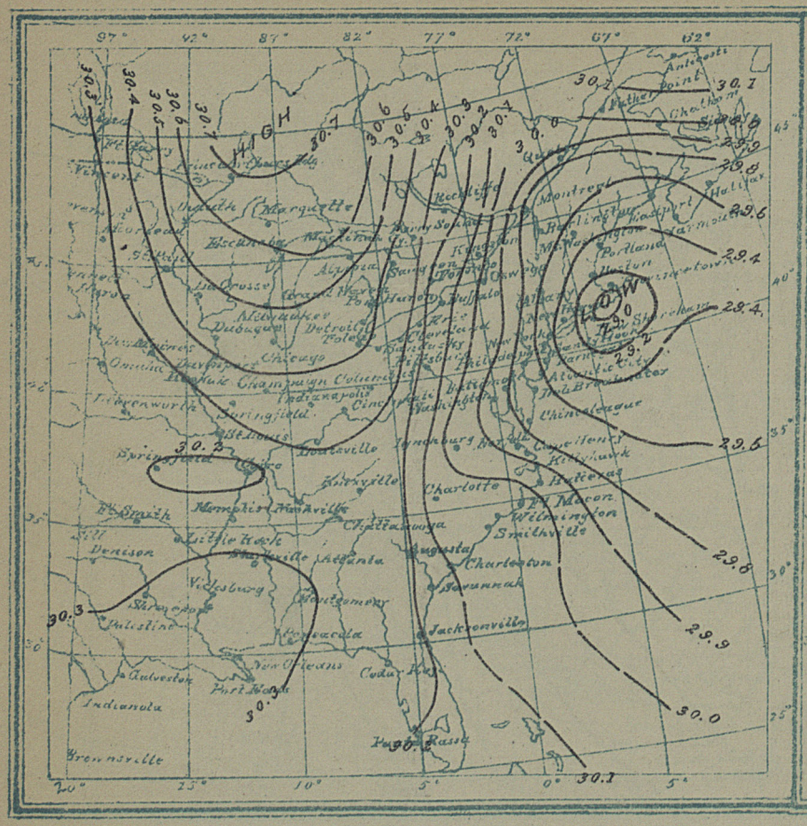
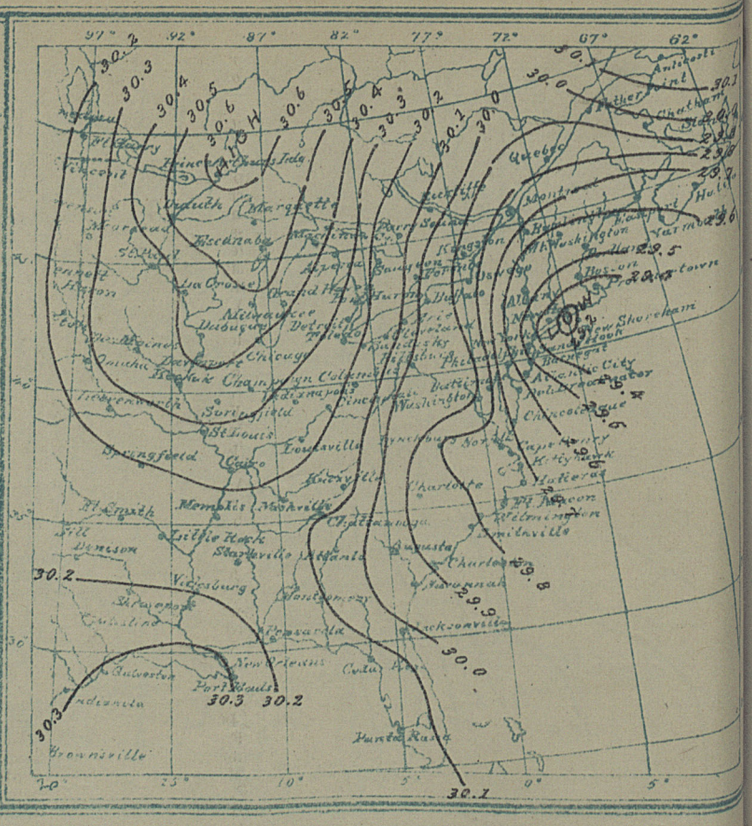


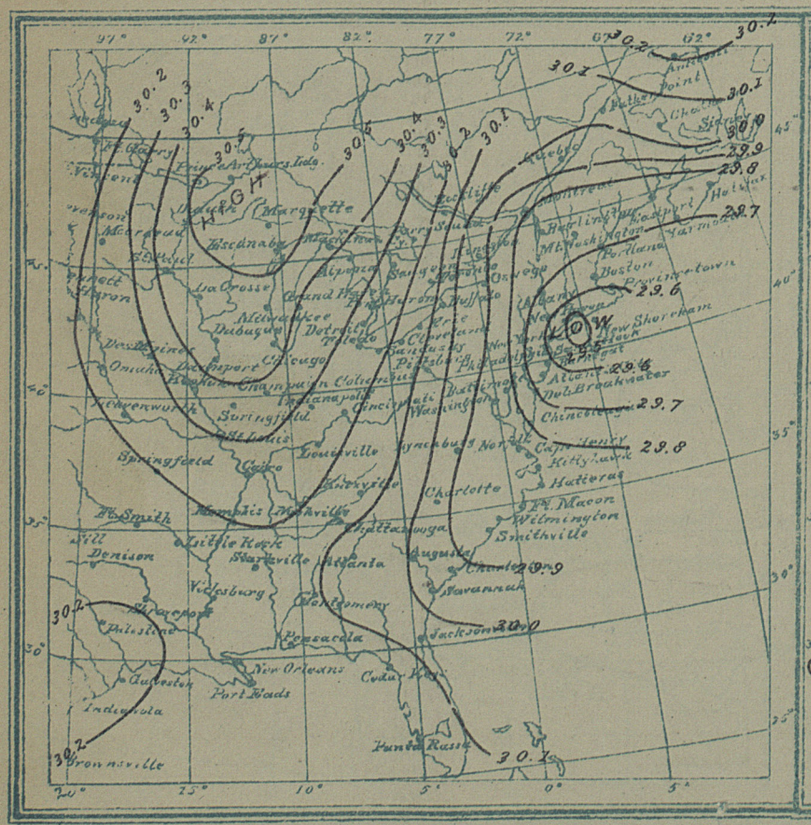
March 13, 1888, 7 A. M.



March 13, 1888, 3 P. M.



March 13, 1888, 10 P. M.



March 14, 1888, 7 A. M.